PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2003-184764
(43)Date of publication of application : 03.07.2003

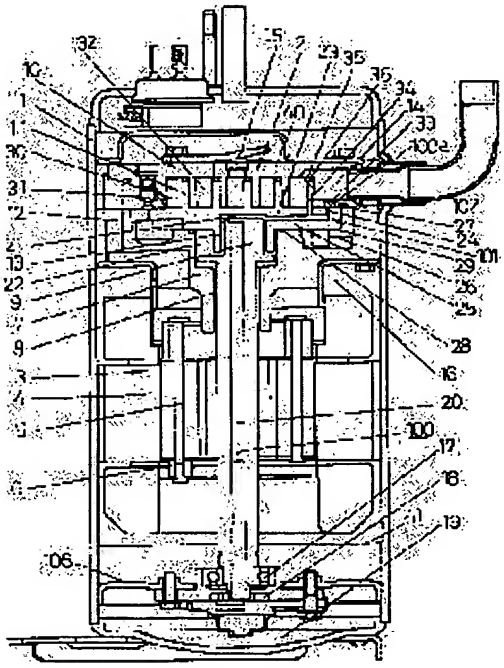
(51)Int.Cl. F04C 18/02
F04C 29/02

(21)Application number : 2001-384135
(22)Date of filing : 18.12.2001

(71)Applicant : MATSUSHITA ELECTRIC IND CO LTD
(72)Inventor : IIDA NOBORU
FUTAGAMI YOSHIYUKI
IWASHIDA AKIRA

(54) SCROLL COMPRESSOR AND ITS DRIVING METHOD

(57)Abstract:
PROBLEM TO BE SOLVED: To improve efficiency and to reduce cost.
SOLUTION: A turning spiral component 11 is made to move around a circle relative to a fixed spiral component 10 so as to perform suction, compression, and delivery by the volume change of a compression space 32. Liquid 41 is fed and lubricates via a shaft 6 for driving the turning spiral component 11 to the bearing part of the side of a compression mechanism part 2 of the shaft. This compressor is provided with a feed limit part 102 intermittently and directly or indirectly communicating with a feed route 100 of the liquid to an operation region of the back pressure according to the rotation of the shaft 6, so that excessive liquid is fed to the compression mechanism part, while the liquid 41 is fed to the rear part of the turning spiral component 11 under a prescribed limit.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's

decision of rejection]
[Date of extinction of right]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] By changing the volume, while the fixed swirl components and revolution swirl components with which the wing started from the end plate are clenched, compression space is formed among both sides, circular orbit movement of the revolution swirl components is carried out to fixed swirl components and compression space moves Supplying liquid through the compression device section which performs inhalation of a fluid, compression, and the regurgitation, and the shaft which drives revolution swirl components, supplying the radical of a predetermined limit of bearing by the side of said compression device section of this shaft in lubrication, then the back pressure room of both revolution swirl components in back, and backing up revolution swirl components In the scrolling compressor equipped with the lubrication device with which supplies superfluous liquid to said compression space, and the lubrication of compressor style circles is presented The scrolling compressor characterized by preparing the supply limit section which is indirectly [directly or] well-informed about the supply path of the liquid which results behind the revolution swirl components which led said shaft intermittently with rotation of a shaft, and restricts supply of liquid to it.
[Claim 2] The supply limit section is a scrolling compressor according to claim 1 currently formed between the members displaced relatively with rotation of a shaft.
[Claim 3] The crevice formed in the field which, as for the supply limit section, slides on each other's nothing revolution swirl components with the revolution swirl components in the supporter material supported from behind in fixed swirl components or said bearing, The condition that consist of opening of the supply path of liquid prepared in the field on which a revolution swirl components side slides mutually, a crevice leads to said back pressure room intermittently by circular orbit movement to the crevice of revolution scrolling, and said opening always leads to a crevice, The condition that a crevice always leads intermittently [said opening] in said crevice through a back pressure room, and the scrolling compressor according to claim 2 with which a crevice is satisfied of one of the condition of leading to a back pressure room and said opening by turns, and the **s.
[Claim 4] A scrolling compressor given in any 1 term of claims 1-3 with the converging section made narrower for a part of supply path than other parts.
[Claim 5] The supply limit section and a converging section are a scrolling compressor given in any 1 term of claims 1-4 which branched even the retention groove which is prepared in the supply path of revolution swirl components, and holds the seal member between fixed swirl components [in / for the upstream / the wing end face of revolution swirl components] rather than the supply limit section and the converging section of this supply path.
[Claim 6] At compressor guard which formed compression space by tabling with the fixed swirl components and revolution swirl components with which the wing started from the end plate, by change of the volume accompanied by migration of the compression space when carrying out

circular orbit movement of the revolution swirl components to fixed swirl components Combining with making inhalation of a fluid, compression, and the regurgitation perform, supplying liquid through the shaft which drives revolution swirl components, supplying bearing by the side of the compression device section of this shaft at lubrication, then the thing of a limit predetermined [both] to the regions of back of revolution swirl components, and backing it up In the drive approach of a scrolling compressor of supplying superfluous liquid here to the compression device section, and planning lubrication The drive approach of the scrolling compressor characterized by driving while the supply path of the liquid to the back pressure operation field where said back pressure which led said shaft acts maintains said back pressure at the predetermined range by leading directly or indirectly intermittently with rotation of a shaft, and restricting supply of liquid.
[Claim 7] The drive approach of a scrolling compressor according to claim 6 of bringing wire drawing to the liquid supplied with the converging section made narrower than other parts in a part of supply path.

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any
damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the scrolling compressor used for refrigerating cycle equipment etc., and its drive approach.
[0002]
[Description of the Prior Art] As this conventional kind of a compressor, as shown in drawing 4 , there are a motor 303 and a scrolling compressor with which the compression device section 302 was arranged in a well-closed container 301, for example. The fixed swirl components 310 and the revolution swirl components 311 with which the wing started from the revolution end plate 325 and the fixed end plate 327 are clenched, and, as for the compression device section 302, the compression space 330 is formed among both sides. The driving shaft 306 is combined with Rota 305 of a motor 303 in the state of penetration. The bearing of the end of this driving shaft 306 is carried out to the main bearing member 307 which constitutes a part of compression device section 302 by main bearing 308. It has the crankshaft 309 which performs eccentric movement to a driving shaft 306 at the tip which came out from the main bearing 308 of this driving shaft 306 upwards.
[0003] If the rotation drive of the driving shaft 306 is carried out by the motor 303, circular orbit movement of the revolution swirl components 311 will be carried out through the fixed pivot carrier 313 with said crankshaft 309. It is moved while the compression space 330 decreases the volume toward a vortical core from the periphery section by this, and a refrigerant gas etc. is inhaled from a passage external cycle, and the inhalation port 314 is compressed. The compressed refrigerant gas etc. is breathed out through the regurgitation port 315 by the space 316 in a well-closed container 301.

[0004] The bearing of the other end side of a driving shaft 306 is carried out by the countershaft receiving part material 317 through countershaft carrier 317a. It has the positive displacement pump 318 at the tip by the side of the other end which came out of countershaft carrier 317a of a driving shaft 306 caudad. A positive displacement pump 318 is supplied to the liquid reservoir 321 which inhales lubricating oils, such as oil which drove by rotation of a driving shaft 306 and was stored by the reservoir 319, and is located through the oil supply path 320 within a driving shaft 306 in the upper part of a crankshaft 309. The liquid which arrived at the liquid reservoir 321 carries out the lubrication of the main bearing 308 for the fixed pivot carrier 313 through the lubrication sump ball 322, lubrication and after cooling, it returns to a reservoir 319, and performs recycling.
[0005] On the other hand, some liquid supplied to the liquid reservoir 321 is decompressed by the converging section 324 via the long hole 323 prepared in the interior of the revolution swirl components 311, and it is supplied to the back pressure room 329 of the revolution end plate 325 in back. In addition, the seal of the back pressure room 329 is carried out in between the liquid reservoirs 322 which serve as the high-pressure section by the seal member 328. A pressure rises as the liquid supplied to the back pressure room 329 collects, but in order to keep the pressure constant, the pressure-regulator style 331 is formed between the back pressure room 329 and low-pressure inhalation region 330a in the compression space 330. It supplies the missed liquid in the compression device section 302 while it will miss the superfluous liquid in the back pressure room 329 in the inhalation region of the compression space 330 and will carry out pressure regulation of the back pressure room 329, if this pressure-regulator style 331 becomes higher than the pressure to which the pressure of the back pressure room 329 was set.
[0006] by this, the liquid supplied to inhalation region 330a while the pressure in the back pressure room 329 was maintained at about 1 law has played the role of the seal which prevents the leakage of the refrigerant gas under compression etc. in the compression space 330, and the role which carries out the lubrication of the contact surface of the fixed swirl components 310 and the revolution swirl components 311.
[0007] Pore 332 is formed in the core by the pin of the shape of a cylinder in which a converging section 324 has screw section 324a for anchoring as shown in drawing 5 . This pore does and decompresses wire drawing to the liquid supplied to the back pressure room 329 through a long hole 323, and a proper amount is supplied. Moreover, the proper amount is adjusted by changing the bore of pore 332. [0008]
[Problem(s) to be Solved by the Invention] However, if the bore of pore 332 is made small or the die length of pore 332 is lengthened in order to raise the drawing effectiveness of a converging section 324 like above-mentioned before, to stop back pressure more and to suppress inhalation heating by supplying liquid to an inhalation region superfluously, it will become easy to blockade with the dust which exists in a lubricating oil, and the engine performance of a compressor will be reduced. In coincidence, processing of pore 332 has the technical problem that cost increases.
[0009] This invention solves such a conventional technical problem, and aims at efficient and offering the scrolling compressor and its drive approach of low cost.
[0010]
[Means for Solving the Problem] In order to attain the above purposes, the scrolling compressor of this invention By changing the volume, while the fixed swirl components and revolution swirl components with which the wing started from the end plate are clenched, compression space is formed among both sides, circular orbit movement of the revolution swirl components is carried out to fixed swirl components and compression space moves Supplying liquid through the compression device section which performs inhalation of a fluid, compression, and the regurgitation, and the shaft which drives revolution swirl components, supplying the radical of a predetermined limit of bearing by the side of said compression device section of this shaft in lubrication, then the back pressure room of both revolution swirl components in back, and backing up revolution swirl components In the scrolling compressor equipped with the lubrication device with which supplies superfluous liquid to said compression space, and the lubrication of compressor style circles is presented It is characterized [main] by preparing the supply limit

section which is indirectly [directly or] well-informed about the supply path of the liquid which results behind the revolution swirl components which led said shaft intermittently with rotation of a shaft, and restricts supply of liquid to it.

[0011] With such a configuration, the compression device section and a lubrication device work by the drive of a shaft. A lubrication device Although it combines with supplying and carrying out the lubrication of the liquid to bearing in the compression device section in accordance with the supply path of the liquid which led said shaft and this liquid is supplied to a back pressure room at the radical of a predetermined limit Since a supply limit is carried out so that liquid may be supplied only when the supply limit section in said supply path leads directly or indirectly intermittently with rotation of said shaft especially Even if it does not narrow the path of a supply path, liquid can be restricted to a proper amount and can be supplied by a setup of this state of restriction, i.e., a setup of the time amount rate and volume which lead intermittently with rotation of a shaft. Therefore, both the problem of the degradation which is easy to get it blocked by extracting like before and making the hole small even when lessening a proper amount more, in order to suppress back pressure and inhalation heating, or dependability, and the problem that processing becomes difficult and becomes cost quantity can be solved, and a scrolling compressor [that it is efficient and low cost] can be offered.

[0012] When the supply limit section is formed between the members displaced relatively with rotation of a shaft, it can set up the condition of said supply limit freely according to the physical relationship of opening which leads each other directly or indirectly intermittently by those relative displacement etc., and has the advantage which realizes an indispensable member and established members.

[0013] The crevice formed in the field which, as for the supply limit section, slides on each other's nothing revolution swirl components with the revolution swirl components in the supporter material supported from behind in fixed swirl components or said bearing, The 1st condition that consist of opening of the supply path of liquid prepared in the field on which a revolution swirl components side slides mutually, a crevice leads to said back pressure room intermittently by circular orbit movement to the crevice of revolution scrolling, and said opening always leads to a crevice, The 2nd condition that a crevice always leads intermittently [said opening] in said crevice through a back pressure room, A crevice is easy to be what is satisfied with a back pressure room and said opening of one of the 3rd condition and **s which lead by turns. In the 3rd condition Since only the liquid which a supply path and a back pressure room did not lead each other to coincidence through the crevice, and was especially received in the crevice through the supply path is supplied to a back pressure room It is effective, especially when it is easy to avoid what it leads each other to coincidence and liquid will be superfluously supplied also to 10,001 and there is no converging section in a supply path.

[0014] a member special only by being able to acquire the drawing effectiveness of extent which has a problem neither in processing nor plugging with this converging section, being able to combine with said supply limit section, being able to attain a higher supply limit easily, and narrowing moderately a part of supply paths, such as revolution swirl components, since such a converging section is easy to process it if it has the converging section made narrower than other parts for a part of supply path -- nothing -- it can form -- . If a converging section is especially formed in opening of a supply path, it can form still more easily. Moreover, if there is said converging section even if there is a time of a supply path and a back pressure room leading each other through a crevice, it can control that liquid is superfluously supplied also to 10,001 by the drawing effectiveness, and will be easy to secure the precision of said supply limit.

[0015] The supply limit section and a converging section are formed in the supply path of revolution swirl components, and even the retention groove which holds the seal member between fixed swirl components [in / for the upstream / the wing end face of revolution swirl components] rather than the supply limit section and the converging section of this supply path can be branched.

[0016] Before receiving the supply limit by the supply limit section and the converging section of liquid with which the lubrication of said bearing is presented with such a configuration, Therefore, only the part which it is easy to induce surplus liquid and the downstream has become that it is

hard to progress with the supply limit section or a converging section in response to the supply limit to a back pressure room about the liquid with which a sufficient pressure and a sufficient amount were secured, without carrying out a supply limit increases the amount of supply to said retention groove. The seal and lubrication between fixed swirl components and revolution swirl components can fully be planned, and it is so advantageous that [, so that the supply limit to a back pressure room is strong, therefore] both the supply limit section and a converging section are formed.

[0017] The drive approach of the scrolling compressor including the case in the above scrolling compressors of this invention At compressor guard which formed compression space by tabling with the fixed swirl components and revolution swirl components with which the wing started from the end plate, by change of the volume accompanied by migration of the compression space when carrying out circular orbit movement of the revolution swirl components to fixed swirl components While combining with making inhalation of a fluid, compression, and the regurgitation perform, supplying liquid through the shaft which drives revolution swirl components and carrying out the lubrication of the bearing by the side of the compression device section of this shaft In the drive approach of a scrolling compressor of supplying superfluous liquid here to the compression device section, and planning lubrication while supplying behind revolution swirl components at the radical of a predetermined supply limit and backing it up The supply path of the liquid to the back pressure operation field where said back pressure which led said shaft acts is characterized [main] by driving maintaining said back pressure at the predetermined range by leading directly or indirectly intermittently with rotation of a shaft, and restricting supply of liquid.

[0018] With such a configuration, the compression device section is used by the drive of a shaft. Inhalation, compression, While supplying and carrying out the lubrication of the liquid to bearing in the compression device section in accordance with the supply path of the liquid which combined with making the regurgitation perform, also used the lubrication device, and led said shaft, although this liquid is supplied to said back pressure operation field at the radical of a predetermined limit Since a supply limit is carried out so that direct [accompanying rotation of said shaft in the supply limit section in said supply path / intermittent] or an indirect target may lead each other and liquid may be especially supplied only at the time Even if it does not narrow the path of a supply path, liquid can be restricted to a proper amount and can be supplied by a setup of this state of restriction, i.e., a setup of the time amount rate and volume which lead directly or indirectly intermittently with rotation of a shaft. therefore, in order to suppress inhalation heating in the inhalation region which misses back pressure and it, even when lessening a proper amount more, the problem of the degradation which is easy to get it blocked by extracting like before and making the hole small, or dependability, and processing become difficult, and become cost quantity -- like -- any in question -- although -- it can cancel and an efficient compression function can be demonstrated by the low cost **** crawl compressor.

[0019] The purpose and the description beyond it of this invention become clear by the following detailed explanation and the publication of a drawing. each description of this invention is independent [its], or it can be boiled as much as possible, can be set, and can be compounded and used in various combination.

[0020]

[Embodiment of the Invention] It explains referring to drawing 1 - drawing 3 about the gestalt of desirable operation of this invention hereafter. The gestalt of this operation has illustrated the case where it applies to the maintenance free scrolling compressor of the closed mold used for air-conditioning and a refrigerator machine. Therefore, the fluid to deal with is a refrigerant and is hereafter explained as a refrigerant. However, this invention is not restricted to this.

[0021] First, it explains about the drive approach of the scrolling compressor concerning the gestalt of this operation, referring to drawing 1 - drawing 3 . Change of the volume accompanied by migration of the compression space 32 when carrying out circular orbit movement of the revolution swirl components 11 to the fixed swirl components 10 makes perform inhalation of a refrigerant, compression, and the regurgitation in the compression device section 2 which formed the compression space 32 by tabling with the fixed swirl components 10 and the revolution swirl

components 11 with which the wing started from the revolution end plate 25 and the fixed end plate 40, as shown in drawing 1 . While supplying and carrying out the lubrication of the lubricating oils 41, such as oil which is an example of liquid, to the main bearing 8 and the fixed pivot carrier 13 which are an example of bearing by the side of the compression device section 2 of this driving shaft 6 through the driving shaft 6 (or and crankshaft 9 at that tip) which is an example of a shaft which combines with this and drives the revolution swirl components 11 Supplying this lubricating oil 41 behind the revolution swirl components 11 at the radical of predetermined supply limit of having used the supply limit section 102, and backing it up, the superfluous lubricating oil 41 here is supplied to the compression device section 2, and lubrication is planned. It drives, while the supply path 100 of the lubricating oil 41 to the back pressure room 29 maintains said back pressure at the predetermined range by [which set up said driving shaft 6 especially as a back pressure operation field where said back pressure which led acts] leading directly or indirectly intermittently with rotation of a driving shaft 6, and restricting supply of a lubricating oil 41, for example.

[0022] Thus, by this approach, the compression device section 2 is used by the drive of a driving shaft 6. It combines with making the regurgitation to the inhalation from the external cycle of a refrigerant, compression, and an external cycle perform. While supplying and carrying out the lubrication of the lubricating oil 41 to the main bearing 8 and the fixed pivot carrier 13 in the compression device section 2 in accordance with the supply path 100 which led said driving shaft 6, although this lubricating oil 41 is supplied to said back pressure room 29 at the radical of a predetermined limit especially, it follows on rotation of said driving shaft 6 in said supply path 100 -- it is intermittent and direct or indirect, since it restricts so that it may lead each other and a lubricating oil 41 may be supplied only at the time Even if it does not narrow the path of the supply path 100, a lubricating oil 41 can be restricted to a proper amount, and can be supplied by a setup of this state of restriction, i.e., a setup of the time amount rate and oil quantity which lead directly or indirectly intermittently with rotation of a driving shaft 6. both [therefore,] the problem of the degradation which is easy to get it blocked by making the conventional drawing hole small even when restricting a proper amount fewer, in order to suppress back pressure and inhalation heating in the inhalation region 30 which misses back pressure, or dependability, and the problem that processing is difficult and becomes cost quantity -- although -- it cancels and efficient operation can be performed with a low cost scrolling compressor.

[0023] The fixed swirl components 10 and the revolution swirl components 11 with which the wing started from the above mentioned revolution end plate 25 and the fixed end plate 40 as a scrolling compressor which attains this are clenched, and the compression space 32 is formed among both sides. While circular orbit movement of the revolution swirl components 11 is carried out to the fixed swirl components 10 at the radical of the rotation constraint by various kinds of rotation restricted components 12 and devices including the Oldham ring and the compression space 32 moves to a vortical center section from the circumference, the volume for example, by making it change so that it may reduce The compression device section 2 which performs inhalation of a fluid, compression, and the regurgitation, The revolution swirl components 11 The driving shaft 6 (and or crankshaft 9 at the tip) to drive Leading, supplying the radical of a predetermined limit of the lubricating oil 41 after [which is bearing by the side of said compression device section 2 of this driving shaft 6] carrying out the lubrication of main bearing 8 and the fixed pivot carrier 13, for example in the back pressure room 29 of the revolution swirl components 11 in back, and backing up the revolution swirl components 11 It has the lubrication device 101 with which misses and supplies a part for the excess of a lubricating oil 41 to said compression space 32, and the lubrication in the compression device section 2 is presented. It has been what formed the supply limit section 102 which is indirectly [directly or] well-informed about the supply path 100 of the lubricating oil 41 which results behind the revolution swirl components 11 which led said driving shaft 6 especially intermittently with rotation of a driving shaft 6, and restricts supply of a lubricating oil 41 to it enough.

[0024] The compression device section 2 and the lubrication device 101 work by the drive by the motor 3 of a driving shaft 6. The lubrication device 101 is combined with supplying a lubricating

oil to the main bearing 8 and the fixed pivot carrier 13 in the compression device section 2, and carrying out lubrication to them in accordance with the supply path 100 of the lubricating oil 41 which led said driving shaft 6. Preventing also supplying the back pressure room 29, backing up the revolution swirl components 11, and being separated or capsized from the fixed swirl components 10 While missing the superfluous lubricating oil 41 in the back pressure room 29 to the compression space 32 and presenting the seal of a there, and the lubrication of the sliding section, the back pressure room 29 is maintained in a predetermined pressure region.

[0025] In such operational status, only when said supply limit section 102 leads to supplying a lubricating oil 41 to the back pressure room 29 at the radical of a predetermined limit directly or indirectly intermittently with rotation of said driving shaft 6 further in the supply path 100, a supply limit is carried out so that a lubricating oil 41 may be supplied. Therefore, even if it does not narrow the path of the supply path 100, a lubricating oil 41 can be restricted and supplied to optimum dose by a setup of this state of restriction, i.e., a setup of a time amount rate in case the supply limit section 102 leads intermittently, or oil quantity. both [therefore,] the problem of the degradation which is easy to get it blocked by extracting like before and making the hole small even when restricting a proper amount to suppressing back pressure and inhalation heating fewer, or dependability, and the problem that processing becomes difficult and becomes cost quantity -- although -- it cancels and an efficient and low cost scrolling compressor is realized.

[0026] When the supply limit section 102 is formed between the members displaced relatively with rotation of a driving shaft 6, it can set up the condition of said supply limit freely according to the physical relationship of opening to which paths, a path, space, etc. lead each other directly or indirectly intermittently by those relative displacement etc., and has the advantage which realizes an indispensable member and established members.

[0027] Specifically the supply limit section 102 The revolution swirl components 11 in the main bearing member 7 which is an example of the supporter material which supports bearings, such as the fixed swirl components 10 or said main bearing 8, from behind the nothing revolution swirl components 11 For example, drawing 1 formed in the revolution end plate 25 and the field on which it slides mutually and the crevice 33 which is illustrated to drawing 2 , It consists of opening 100a of the supply path 100 prepared in the field on which the revolution swirl components 11 side slides mutually. The 1st condition that a crevice 33 leads to the back pressure room 29 intermittently, and said opening 100a always leads to a crevice 33 by circular orbit movement to the crevice 33 of the revolution swirl components 11, A crevice 33 is always easy to satisfy one of the 2nd condition that said opening 100a leads to said crevice 33 intermittently, the 3rd condition that a crevice 33 leads to the back pressure room 29 and said opening 100a by turns, and the **s through the back pressure room 29. Especially in these 3rd condition, since only the lubricating oil 41 which the supply path 100 and the back pressure room 29 did not lead each other to coincidence through the crevice 33, and was supplied to the crevice 33 through the supply path 100 is supplied to the back pressure room 29, it is easy to avoid what it leads each other to coincidence and a lubricating oil 41 will be superfluously supplied also to 10,001.

[0028] Moreover, if it has the converging section of various gestalten including the diaphragm hole 24 which extracted the path rather than other parts to a part of supply path 100, and was narrowed as shown in drawing 1 and drawing 2 The drawing effectiveness of extent which has a problem neither in processing nor plugging is acquired with this converging section. a member special only by being able to combine with said supply limit section 102, being able to attain a higher supply limit easily, and narrowing a part of supply paths 100, such as the revolution swirl components 11, since such a converging section is easy to process it -- nothing -- it can form . If it prepares in the opening 100a section of the supply path 100 as especially shown in drawing 1 and drawing 2 , it can form with a sufficient precision still more easily, and especially if it considers as a round hole, it will be easy to process it. Moreover, even if there is a time of the supply path 100 and the back pressure room 29 leading each other through a crevice 33 unlike the example shown in drawing 1 and drawing 2 , it can control that a lubricating oil 41 is superfluously supplied also to 10,001 by the drawing effectiveness, such as said drawing hole 24, and it is easy to secure the precision of said supply limit.

[0029] Converging sections, such as the supply limit section 102 and the diaphragm hole 24, are formed in the supply path 100 of the revolution swirl components 11, as shown in drawing 1 , and they have formed the fork road 34 which branched even the retention groove 36 which holds the chip seal 35 as a seal member between the fixed swirl components [in / for the upstream / the wing end face of the revolution swirl components 11] 10 rather than the supply limit section 102 and the converging section of this supply path 100. Before this receives the supply limit by converging sections, such as the supply limit section 102 and the diaphragm hole 24, Therefore, the lubricating oil 41 to which a sufficient pressure and a sufficient amount were secured, without carrying out a supply limit Only the part which it is easy to induce surplus liquid and the downstream has become that it is hard to progress with the supply limit section 102 or a converging section in response to the supply limit to the back pressure room 29 increases the amount of supply to said retention groove 36 which led the fork road 34. The seal and lubrication between the fixed swirl components 10 and the revolution swirl components 11 can fully be planned, and it is so advantageous that [, so that a supply limit is strong, therefore] it extracts as the supply limit section 102 and both sides with converging sections, such as a hole 24, are prepared. When sufficient seal nature and lubricity can be secured according to the device which supplies a lubricating oil 41 to the sliding section of such fixed swirl components 10 and the revolution swirl components 11 directly, it is not necessary to perform the superfluous lubricating oil 41 of the back pressure room 29 to the inhalation region 30 to miss by the pressure-regulator style 31.

[0030] The example shown in drawing 1 of the gestalt of this operation and drawing 2 is explained still more concretely. A driving shaft 6 is connected with a motor 3, and drives the compression device section 2. The compression device section 2 and a motor 3 are arranged up and down in the well-closed container 1 of a vertical mold. The motor 3 consists of a stator 4 fixed inside the well-closed container 1, and Rota 5 arranged so that it can rotate inside this stator 4. A driving shaft 6 is combined with this Rota 5 in the state of penetration, the bearing of the end of this driving shaft 6 is carried out to the main bearing member 7 which constitutes a part of above-mentioned compression device section 2 through main bearing 8, the bearing of the other end side is carried out through the countershaft carrier 17 by the countershaft receptacle member 106 prepared in the lower part in a well-closed container 1, and the driving shaft 6 is supported by this so that it can really rotate with Rota 5.

[0031] It has the crankshaft 9 which performs eccentric movement to a driving shaft 6 at the tip by the side of the end which came out on the main bearing 8 of a driving shaft 6. While forming two or more compression space 32 by on the other hand engaging the fixed swirl components 10 and the revolution swirl components 11 which were directly fixed through the main bearing member 7 in the well-closed container 1, the revolution swirl components 11 are put and held between the main bearing member 7 and the fixed swirl components 10. It is only made to circle the revolution swirl components 11 along a circular orbit by combining the rotation restricted components 12 with preventing rotation of the revolution swirl components 11 in preparation for between the main bearing member 7 and the revolution swirl components 11, and driving the revolution swirl components 11 through the fixed pivot carrier 13 with a crankshaft 9. By this, the compression space 32 is moved decreasing the volume toward a vortical core from the periphery section, and a refrigerant gas etc. is inhaled and compressed from an external cycle through the inhalation port 14. Moreover, the compressed refrigerant gas etc. passes along the regurgitation port 15, and is breathed out by the space 16 in a well-closed container.

[0032] Moreover, it has a positive displacement pump 18 at the tip by the side of the other end which came out of the countershaft carrier 17 of a driving shaft 6 caudad, and drives with the compression device section 2 with a driving shaft 6. After a positive displacement pump 18 inhales the lubricating oil 41 stored by the reservoir 19 formed in the lower part of a well-closed container 1, it is supplied to the liquid reservoir 21 of the upper part of a crankshaft 9 through the oil supply way 20 prepared in the driving shaft 6 at the shaft orientations. It is sent into the fixed pivot carrier 13 with which the lubricating oil 41 supplied to the liquid reservoir 21 by this follows this, it is further sent in by main bearing 8 through the liquid reservoir 22 of the degree lubrication and after cooling, the lubrication of this is carried out, it returns to a reservoir 19

after that, and recycling is carried out. On the other hand, some lubricating oils 41 supplied to the liquid reservoir 21 are supplied to the back pressure room 29 through the drawing hole 24 as a converging section made thinner than a long hole 23 via the long hole 23 prepared in the interior of the revolution swirl components 11. For this supply, said crevice 33 is formed in the revolution end plate 25 of the fixed swirl components 10, and the field 27 on which it slides, extracts by circular orbit movement of the revolution swirl components 11 accompanying rotation of a driving shaft 6, leads each other as intermittently [a hole 24] as said crevice 33, and the lubricating oil 41 is supplied. Therefore, that a lubricating oil 41 is supplied to a crevice 33 becomes only the case where the diaphragm hole 24 has attended the crevice 33 from the diaphragm hole 24.

[0033] Furthermore, as for a crevice 33, the revolution end plate 25 opens a crevice 33 and the back pressure room 29 for free passage to an intermission by revolution of the revolution end plate 25. Moreover, the free passage section of a crevice 33 and the back pressure room 29 is set up so that the section which the diaphragm hole 24 does not face a crevice 33 may come, and the diaphragm hole 24 and the back pressure room 29 are not open for free passage through a crevice 33. The lubricating oil 41 supplied to the crevice 33 from the drawing hole 24 is supplied to the back pressure room 29 by both differential pressure, when a crevice 33 and the back pressure room 29 are open for free passage. In addition, although the back pressure room 29 is the space which was established in the revolution end plate 25 and the main bearing member 7 and which became depressed and consisted of 26, a field 27 of the fixed swirl components 10, and a seal member 28, it may be constituted how.

[0034] it is easy to boil and set up various said time amount rates and volume which lead each other intermittently with the combination of the configuration of a crevice 33, or a magnitude and the location of opening 100a with the configuration which extracts as such a crevice 33 and leads each other intermittently among opening 100a, such as a hole 24. Especially by the type whose crevice 33 carries and supplies the lubricating oil 41 of the specified quantity to the supply path 100 and the back pressure room 29 through alternation, the volume supplied at once by capacity setup of a crevice 33 can be set up freely, and the amount of supply of the lubricating oil 41 to the back pressure room 29 can be decided by the product with the time amount rate of leading each other to the back pressure room 29.

[0035] Moreover, it can lead each other to opening 100a of the supply path 100 which established such a crevice 33 in the revolution swirl components 11 of the main bearing member 7, and the field which slides, and was prepared in the sliding surface of the revolution swirl components 11 intermittently. Furthermore, the same operation effectiveness is theoretically acquired also in combination with the hole prepared so that a crevice 33 might be formed in a sliding surface with the fixed swirl components 10 of the revolution swirl components 11, or the main bearing member 7, said crevice 33 and end might lead to the sliding surface of this sliding surface, the fixed swirl components 10 which slide, or the main bearing member 7 intermittently and the other end might always lead to the back pressure room 29.

[0036] The supply path 100 of a lubricating oil 41 is constituted from the downward other end of a driving shaft 6 by the oil supply way 20, a liquid reservoir 21, a long hole 23, the diaphragm hole 24, and the crevice 33, and the diaphragm hole 24 restricts the amount of supply of the lubricating oil 41 from the liquid reservoir 21 to the back pressure room 29 with the supply limit section 102, and enables it to supply a proper amount in what carried out [above-mentioned] illustration. Since differential pressure is between a liquid reservoir 21, or 22 and the back pressure room 29 here and the liquid reservoir 21 side is the high-tension side to the back pressure room 29 side, Said seal member 28 was formed annularly between the revolution swirl components 11 and the main bearing member 7, and it has prevented that, as for a batch, they lead [room / 29 / which is located in the area around / the liquid reservoirs 21 and 22 of a central site, and / back pressure] each other in said supply limit section 102 and the diaphragm hole 24, without passing.
 [0037] By the way, the supply path 100 may be made into the path which passes through one side or the both sides of main bearing 8 and the fixed pivot carrier 13. The clearance when making it into plain bearing, when the supply path 100 is a path which passes through main bearing 8 or the fixed pivot carrier 13 can be used as a converging

section, if it does in this way, it will extract, if the same diaphragm effectiveness is acquired and both sides are used together even if it omits a hole 24, it will extract, and effectiveness improves further. But the supply limit section 100 of adopting as an indispensable thing is natural, and it is suitable for it for this to also be theoretically prepared in the location of supply path 102 throat, and to use the relative-displacement part accompanying rotation of a driving shaft 6.

[0038] Moreover, said rotation restricted component 12 is arranged in the back pressure room 29, and the lubricating oil 41 supplied to this back pressure room 29 is performing lubrication. The pressure of the back pressure room 29 rises as the lubricating oil 41 supplied to the back pressure room 29 collects, but in order to keep the pressure constant, the pressure-regulator style 31 is constituted between the back pressure room 29 and the inhalation region 30 which generates compression space. If it becomes higher than the pressure to which the pressure of the back pressure room 29 was set, the pressure-regulator style 31 will operate and the superfluous lubricating oil 41 in the back pressure room 29 will be missed in the inhalation region 30 which is the depression in the compression space 32. While this maintains at the almost fixed range which had the pressure in the back pressure room 29 set up, the role of the seal which prevents the leakage of the refrigerant gas under compression etc., and the role which carries out the lubrication of the contact surface of the fixed swirl components 10 and the revolution swirl components 11 are played by supplying the lubricating oil 41 missed in the inhalation region 30 to the compression space 32.

[0039] Although it is useful to each of the supply limit section 102, the diaphragm hole 24, and the pressure-regulator style 31 adjusting the pressure of the back pressure room 29 here The pressure-regulator style 31 is useful also to the seal at the time of refrigerant compression in the lubrication and the compression space 32 of the compression device section 2. When such lubrication and a seal are indispensable, Unless the supply means of the special lubricating oil 41 to the compression device section 2 is established, the pressure-regulator style 31 becomes indispensable, will collaborate with the supply limit section 102 at least, and will perform pressure regulation of the back pressure room 29.

[0040] Next, drawing 3 is also used together and the drawing hole 24 in an example and crevice 33 which are shown in drawing 1 and drawing 2 are explained to a detail. The drawing hole 24 performs the circular motion which attends the field 27 and crevice 33 of the fixed swirl components 10, respectively with revolution of the revolution swirl components 11 so that the circular movement condition in every 90 degrees shown in (a) - (d) of drawing 2 of the revolution swirl components 11 may show. As shown in (c), when the drawing hole 24 has attended the crevice 33, the lubricating oil 41 of ****** 21 is extracted as a long hole 23, and is supplied to a crevice 33 via a hole 24. At this time, it is blockaded with the revolution end plate 25, and the crevice 33 does not lead to the back pressure room 29. On the other hand, as shown in (a), (b), and (d), when the diaphragm hole 24 has faced the field 27 of the fixed swirl components 10, the diaphragm hole 24 is blockaded by the field 27, and a lubricating oil 41 is not supplied to a crevice 33. At this time, the crevice 33 leads to the back pressure room 29 from the revolution end plate 25 at the flash and the back pressure room 29.

[0041] Thus, it extracts by revolution of the revolution swirl components 11, and a hole 24 is made intermittently open for free passage with a crevice 33 by the field 27 of the fixed swirl components 10, and is made to open a crevice 33 for free passage intermittently with the back pressure room 29 with the revolution end plate 25. Moreover, the free passage section of a crevice 33 and the back pressure room 29 is set as the section which the diaphragm hole 24 does not face a crevice 33, and the diaphragm hole 24 and the back pressure room 29 do not open each other for free passage through a crevice 33. The lubricating oil 41 which extracted to the crevice 33 and was supplied from the hole 24 is supplied to the back pressure room 29 by those differential pressure from a crevice 33, when a crevice 33 and the back pressure room 29 are open for free passage.

[0042] Of course, this supply is performed until a crevice 33 becomes the back pressure room 29 and this **, and the lubricating oil of the back pressure room 29 and this ** remains in a crevice 33. Therefore, the oil quantity to which a crevice 33 is supplied through the supply path 100 next is only a part equivalent to said differential pressure, and constant feeding of this is

carried out to the back pressure room 29 each time.
[0043] Thus, since only the lubricating oil 41 collected on the crevice 33 is carried intermittently and supplied to the back pressure room 29 with rotation of a driving shaft 6, the lubricating oil 41 supplied to the back pressure room 29, as a result the inhalation region 30 can be controlled, the superfluous contact by superfluous back pressure and inhalation heating by the overage to the inhalation region 30 can be reduced, and degradation can be stopped. The amount of the lubricating oil 41 supplied to the back pressure room 29 can be adjusted changing the depth and the path of a crevice 33, or by changing a setup of said differential pressure. as [show / moreover, / in drawing 4 / the configuration of a crevice 33] -- I hope that it is not circular.
[0044] In addition, although this invention used the positive displacement pump for supply of a lubricating oil, the same effectiveness can be acquired also when adopting the differential pressure oil supply mold pump method which supplies a lubricating oil 41 by differential pressure with the back pressure room 29 using the discharge pressure of a refrigerant.
[0045]
[Effect of the Invention] According to the scrolling compressor and its drive approach of this invention, the compression device section and a lubrication device work by the drive of a shaft. A lubrication device Although it combines with supplying and carrying out the lubrication of the liquid to bearing in the compression device section in accordance with the supply path of the liquid which led said shaft and this liquid is supplied to a back pressure room at the radical of a predetermined limit Since a supply limit is carried out so that liquid may be supplied only when the supply limit section in said supply path leads directly or indirectly intermittently with rotation of said shaft especially Even if it does not narrow the path of a supply path, liquid can be restricted to a proper amount and can be supplied by a setup of this state of restriction, i.e., a setup of the time amount rate of leading intermittently, or volume. both [therefore,] the problem of the degradation which is easy to get it blocked by extracting like before and making the hole small even when lessening a proper amount more, in order to suppress back pressure and inhalation heating, or dependability, and the problem that processing becomes difficult and becomes cost quantity -- although -- it cancels and a scrolling compressor [that it is efficient and low cost] is realized.
[0046] Furthermore, when the supply limit section is formed between the members displaced relatively with rotation of a shaft, the condition of said supply limit can be freely set up according to the physical relationship of opening which leads each other directly or indirectly intermittently by those relative displacement etc., and there is an advantage which realizes an indispensable member and established members.
[0047] Moreover, the crevice where the supply limit section was formed [components / nothing revolution swirl] in the revolution swirl components in the supporter material supported from behind, and the field on which it slides mutually in fixed swirl components or said bearing, The 1st condition that consist of opening of the supply path of liquid prepared in the field on which a revolution swirl components side slides mutually, a crevice leads to said back pressure room intermittently by circular orbit movement to the crevice of revolution scrolling, and said opening always leads to a crevice, The 2nd condition that a crevice always leads intermittently [said opening] in said crevice through a back pressure room, A crevice is easy to be what is satisfied with a back pressure room and said opening of one of the 3rd condition and **s which lead by turns. In the 3rd condition Since only the liquid which a supply path and a back pressure room did not lead each other to coincidence through the crevice, and was especially received in the crevice through the supply path is supplied to a back pressure room It is effective, especially when it is easy to avoid what it leads each other to coincidence and liquid will be superfluously supplied also to 10,001 and there is no converging section in a supply path.
[0048] moreover, a member special only by being able to acquire the drawing effectiveness of extent which has a problem neither in processing nor plugging with this converging section, being able to combine with said supply limit section, being able to attain a higher supply limit easily, and narrowing moderately a part of supply paths, such as revolution swirl components, since such a converging section is easy to process it if it has the converging section made narrower than other parts for a part of supply path -- nothing -- it can form -- . If a converging section is

especially formed in opening of a supply path, it can form still more easily. Moreover, if there is said converging section even if there is a time of a supply path and a back pressure room leading each other through a crevice, it can control that liquid is superfluously supplied also to 10,001 by the drawing effectiveness, and will be easy to secure the precision of said supply limit.
[0049] Moreover, if even the retention groove which the supply limit section and a converging section are formed in the supply path of revolution swirl components, and holds the seal member between fixed swirl components [in / for the upstream / the wing end face of revolution swirl components] rather than the supply limit section and the converging section of this supply path is branched Before receiving the supply limit by the supply limit section and the converging section of liquid with which the lubrication of said bearing is presented, Therefore, only the part which it is easy to induce surplus liquid and the downstream has become that it is hard to progress with the supply limit section or a converging section in response to the supply limit to a back pressure room about the liquid with which a sufficient pressure and a sufficient amount were secured, without carrying out a supply limit increases the amount of supply to said retention groove. The seal and lubrication between fixed swirl components and revolution swirl components can fully be planned, and it is so advantageous that [, so that the supply limit to a back pressure room is strong, therefore] both the supply limit section and a converging section are formed.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The sectional view showing the scrolling compressor concerning the gestalt of one operation of this invention.
[Drawing 2] The explanatory view showing the operating state of the supply limit section in the compressor of drawing 1 with the revolution location in every 90 degrees of the revolution swirl components of (a) - (d).
[Drawing 3] The partial enlarged drawing of the supply limit section of drawing 2 .
[Drawing 4] The sectional view showing the conventional scrolling compressor.
[Drawing 5] The sectional view of a converging section established in the path which supplies the lubricating oil in the compressor of drawing 4 to a back pressure room.
[Description of Notations]
1 Well-closed Container
2 Compression Device Section
3 Motor
6 Driving Shaft
7 Main Bearing Member
8 Main Bearing
9 Crankshaft
10 Fixed Swirl Components

(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号
特開2003－184764
（P2003－184764A）
(43)公開日　平成15年７月３日(2003.7.3)

(51)Int.Cl.⁷	識別記号	ＦＩ	テーマコード（参考）
Ｆ０４Ｃ　18/02	３１１	Ｆ０４Ｃ　18/02	３１１Ｗ　３Ｈ０２９
			３１１Ｌ　３Ｈ０３９
29/02	３２１	29/02	３２１Ａ

審査請求　未請求　請求項の数７　ＯＬ　（全 10 頁）

(21)出願番号　特願2001－384135(P2001－384135)

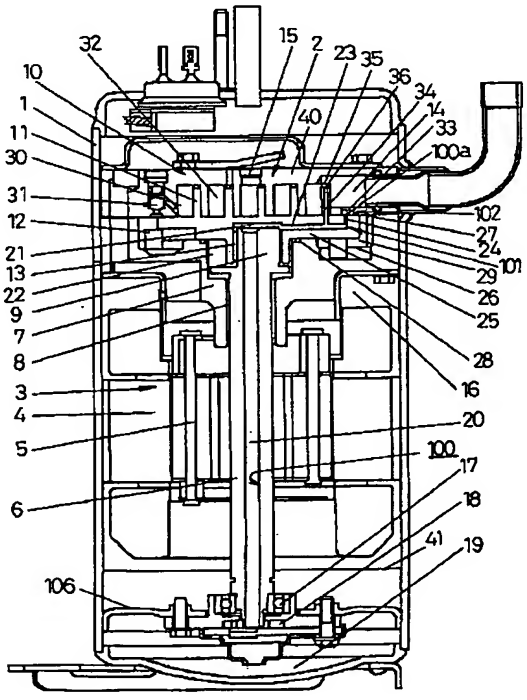
(22)出願日　平成13年12月18日(2001.12.18)

(71)出願人　000005821
松下電器産業株式会社
大阪府門真市大字門真1006番地
(72)発明者　飯田　登
大阪府門真市大字門真1006番地　松下電器産業株式会社内
(72)発明者　二上　義幸
大阪府門真市大字門真1006番地　松下電器産業株式会社内
(74)代理人　100080827
弁理士　石原　勝

最終頁に続く

(54)【発明の名称】　スクロール圧縮機とその駆動方法

(57)【要約】
【課題】　高効率かつ低コストなものとする。
【解決手段】　旋回渦巻部品１１を固定渦巻部品１０に対し円軌道運動させて圧縮空間３２の容積変化により吸入、圧縮および吐出を行うとともに、旋回渦巻部品１１を駆動する軸６を通じこの軸６の圧縮機構部２側軸受部に液４１を供給して潤滑し、またこの液４１を旋回渦巻部品１１の背部に所定の制限のものとに供給しながら、過剰液を圧縮機構部２に供給するのに、軸６を通じた前記背圧の作用領域への液４１の供給経路１００に、軸６の回転に伴い間欠的に直接または間接に通じる供給制限部１０２を設けて液４１の供給を制限することにより、上記の目的を達成する。



1

【特許請求の範囲】

【請求項１】　鏡板から羽根が立ち上がった固定渦巻部品と旋回渦巻部品とが噛み合わされて双方間に圧縮空間が形成され、旋回渦巻部品が固定渦巻部品に対し円軌道運動されて圧縮空間が移動しながら容積を変化させることにより、流体の吸入、圧縮および吐出を行う圧縮機構部と、旋回渦巻部品を駆動する軸を通じ液を供給してこの軸の前記圧縮機構部側の軸受部を潤滑するとともに旋回渦巻部品の背部の背圧室に所定の制限の基に供給し旋回渦巻部品をバックアップしながら、過剰液を前記圧縮空間に供給して圧縮機構部内の潤滑に供する潤滑機構とを備えたスクロール圧縮機において、

前記軸を通じた旋回渦巻部品の背部に至る液の供給経路に、軸の回転に伴い間欠的に直接または間接的に通じて液の供給を制限する供給制限部を設けたことを特徴とするスクロール圧縮機。

【請求項２】　供給制限部は、軸の回転に伴い相対移動する部材間で形成している請求項１に記載のスクロール圧縮機。

【請求項３】　供給制限部は、固定渦巻部品または前記軸受部をなし旋回渦巻部品を背部から支持する支持部材における旋回渦巻部品と摺動し合う面に形成された凹部と、旋回渦巻部品の側の摺動し合う面に設けられた液の供給経路の開口とからなり、旋回スクロールの凹部に対する円軌道運動によって凹部が前記背圧室に間欠的に通じ前記開口が凹部に常時通じる状態と、凹部が常時背圧室に通じ前記開口が前記凹部に間欠的に通じる状態と、凹部が背圧室と前記開口とに交互に通じる状態と、の１つを満足する請求項２に記載のスクロール圧縮機。

【請求項４】　供給経路の一部に他の部分よりも狭くした絞り部を有した請求項１～３のいずれか１項に記載のスクロール圧縮機。

【請求項５】　供給制限部や絞り部は、旋回渦巻部品の供給経路に設けられ、この供給経路の供給制限部や絞り部よりも上流側を旋回渦巻部品の羽根端面における固定渦巻部品との間のシール部材を保持する保持溝にまで分岐させた請求項１～４のいずれか１項に記載のスクロール圧縮機。

【請求項６】　鏡板から羽根が立ち上がった固定渦巻部品と旋回渦巻部品との噛み合わせにて圧縮空間を形成した圧縮機構にて、旋回渦巻部品を固定渦巻部品に対し円軌道運動させたときの圧縮空間の移動を伴う容積の変化により、流体の吸入、圧縮および吐出を行わせるのに併せ、旋回渦巻部品を駆動する軸を通じ液を供給してこの軸の圧縮機構部側の軸受部を潤滑するとともに旋回渦巻部品の背部には所定の制限のものとに供給してそれをバックアップしながら、ここでの過剰液を圧縮機構部に供給して潤滑を図るスクロール圧縮機の駆動方法において、

前記軸を通じた前記背圧が作用する背圧作用領域への液の供給経路が、軸の回転に伴い間欠的に直接または間接に通じて液の供給を制限することにより、前記背圧を所定の範囲に保ちながら駆動することを特徴とするスクロール圧縮機の駆動方法。

2

【請求項７】　供給経路の一部で他の部分よりも狭くした絞り部にて供給する液に絞り作用をもたらす請求項６に記載のスクロール圧縮機の駆動方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は冷凍サイクル装置等に用いられるスクロール圧縮機とその駆動方法に関するものである。

【０００２】

【従来の技術】従来のこの種の圧縮機としては、例えば、図４に示すように密閉容器３０１内に、電動機３０３と、圧縮機構部３０２が配設されたスクロール圧縮機がある。圧縮機構部３０２は旋回鏡板３２５および固定鏡板３２７から羽根が立ち上がった固定渦巻部品３１０と旋回渦巻部品３１１とが噛み合わされて双方間に圧縮空間３３０が形成されている。電動機３０３のロータ３０５に駆動軸３０６が貫通状態で結合されている。この駆動軸３０６の一端は圧縮機構部３０２の一部を構成する主軸受部材３０７に主軸受３０８によって軸受けされている。この駆動軸３０６の主軸受３０８から上に出た先端には駆動軸３０６に対して偏心運動を行うクランク軸３０９が備えられている。

【０００３】駆動軸３０６が電動機３０３により回転駆動されると、前記クランク軸３０９により旋回軸受３１３を介して旋回渦巻部品３１１を円軌道運動させる。これによって圧縮空間３３０は外周部から渦巻の中心に向かって容積を減少させながら移動させられて、吸入ポート３１４を通じ外部サイクルから冷媒ガス等を吸入し、圧縮する。圧縮した冷媒ガス等は吐出ポート３１５を通じて密閉容器３０１内の空間３１６に吐出される。

【０００４】駆動軸３０６の他端側は副軸受部材３１７によって副軸受３１７ａを介し軸受けされている。駆動軸３０６の副軸受３１７ａから下方に出た他端側の先端には容積型ポンプ３１８を備えている。容積型ポンプ３１８は駆動軸３０６の回転によって駆動され液溜部３１９に貯留されたオイルなどの潤滑油を吸入して駆動軸３０６内の給油経路３２０を通じクランク軸３０９の上部にある液溜まり３２１に供給する。液溜まり３２１に達した液は旋回軸受３１３を潤滑および冷却した後、潤滑油溜まり３２２を経て主軸受３０８を潤滑し、液溜部３１９に戻って再循環を行う。

【０００５】一方、液溜まり３２１に供給された液の一部は、旋回渦巻部品３１１の内部に設けられた長孔３２３を経由して絞り部３２４により減圧され、旋回鏡板３２５の背部の背圧室３２９に供給される。なお、背圧室３２９はシール部材３２８により高圧部となる液溜まり

３２２との間をシールされている。背圧室３２９に供給された液が溜まるに従い圧力が上昇するが、その圧力を一定に保つために、背圧室３２９と圧縮空間３３０における低圧の吸入域３３０ａとの間に圧力調整機構３３１が設けられている。この圧力調整機構３３１は背圧室３２９の圧力が設定された圧力より高くなると背圧室３２９内の過剰液を圧縮空間３３０の吸入域に逃がして、背圧室３２９の圧力調整をするとともに、逃がした液を圧縮機構部３０２内に供給する。

【０００６】これによって、背圧室３２９内の圧力はほぼ一定に保たれる一方、吸入域３３０ａに供給された液は圧縮空間３３０にて、圧縮中の冷媒ガス等の漏れを防ぐシールの役割と、固定渦巻部品３１０と旋回渦巻部品３１１の接触面を潤滑する役割を果たしている。

【０００７】絞り部３２４は図５に示すように、取付け用のネジ部３２４ａを持つ円筒状のピンで中心に細孔３３２が形成されている。この細孔は長孔３２３を通じ背圧室３２９に供給される液に対し絞り作用を及ぼして減圧し適正量が供給されるようにする。また適正量は細孔３３２の内径を変更することにより調整している。

【０００８】

【発明が解決しようとする課題】しかしながら、上記従来のように絞り部３２４の絞り効果を上げて背圧をより抑え、吸入域へ液を過剰に供給することによる吸入加熱を抑えるために細孔３３２の内径を小さくしたり細孔３３２の長さを長くすると潤滑油に存在するゴミにより閉塞しやすくなり、圧縮機の性能を低下させる。同時に、細孔３３２の加工はコストが増大するといった課題を有している。

【０００９】本発明はこのような従来の課題を解決するものであり、高効率かつ低コストのスクロール圧縮機とその駆動方法を提供することを目的とする。

【００１０】

【課題を解決するための手段】上記のような目的を達成するために、本発明のスクロール圧縮機は、鏡板から羽根が立ち上がった固定渦巻部品と旋回渦巻部品とが噛み合わされて双方間に圧縮空間が形成され、旋回渦巻部品が固定渦巻部品に対し円軌道運動されて圧縮空間が移動しながら容積を変化させることにより、流体の吸入、圧縮および吐出を行う圧縮機構部と、旋回渦巻部品を駆動する軸を通じ液を供給してこの軸の前記圧縮機構部側の軸受部を潤滑するとともに旋回渦巻部品の背部の背圧室に所定の制限の基に供給し旋回渦巻部品をバックアップしながら、過剰液を前記圧縮空間に供給して圧縮機構部内の潤滑に供する潤滑機構とを備えたスクロール圧縮機において、前記軸を通じた旋回渦巻部品の背部に至る液の供給経路に、軸の回転に伴い間欠的に直接または間接的に通じて液の供給を制限する供給制限部を設けたことを主たる特徴とする。

【００１１】このような構成では、軸の駆動で圧縮機構部および潤滑機構が働き、潤滑機構は、前記軸を通じた液の供給経路に沿って圧縮機構部における軸受部に液を供給して潤滑するのに併せ、この液を所定の制限の基に背圧室に供給するのに、特に、前記供給経路における供給制限部が前記軸の回転に伴い間欠的に直接または間接的に通じたときだけ液を供給するように供給制限をするので、この制限状態の設定によって、つまり軸の回転に伴い間欠的に通じる時間割合や液量の設定によって、供給経路の通路を狭くしなくても液を適正量に制限して供給することができる。従って、背圧や吸入加熱を抑えるために適正量をより少なくするような場合でも、従来のように絞り孔を小さくしていくことにより詰まりやすくなっていた性能低下や信頼性の問題、および加工が困難になってコスト高になるというような問題のいずれも解消し、高効率で低コストなスクロール圧縮機を提供することができる。

【００１２】供給制限部は、軸の回転に伴い相対移動する部材間に形成されていると、それらの相対移動によって間欠的に直接または間接的に通じ合う開口の位置関係などによって前記供給制限の状態を自由に設定することができるし、必須の部材や既設の部材どうしでも実現する利点がある。

【００１３】供給制限部は、固定渦巻部品または前記軸受部をなし旋回渦巻部品を背部から支持する支持部材における旋回渦巻部品と摺動し合う面に形成された凹部と、旋回渦巻部品の側の摺動し合う面に設けられた液の供給経路の開口とからなり、旋回スクロールの凹部に対する円軌道運動によって凹部が前記背圧室に間欠的に通じ前記開口が凹部に常時通じる１つ目の状態と、凹部が常時背圧室に通じ前記開口が前記凹部に間欠的に通じる２つ目の状態と、凹部が背圧室と前記開口とに交互に通じる３つ目の状態と、の１つを満足するものでよく、３つ目の状態では、特に、供給経路と背圧室とが凹部を介して同時に通じ合うことがなく、供給経路と通じて凹部に受け入れた液だけが背圧室に供給されるので、同時に通じ合って万一にも液が過剰に供給されてしまうようなことを回避しやすく、供給経路に絞り部がない場合に特に有効である。

【００１４】供給経路の一部に他の部分よりも狭くした絞り部を有していると、この絞り部により加工や詰まりに問題のない程度の絞り効果を得て、前記供給制限部と併せ、より高い供給制限を容易に達成することができるし、そのような絞り部は加工が容易であるので旋回渦巻部品などの供給経路の一部を適度に狭くするだけで特別な部材なしに形成することができる。特に、絞り部を供給経路の開口部に設ければさらに容易に形成することができる。また、供給経路と背圧室とが凹部を介して通じ合う時点があっても前記絞り部があるとその絞り効果によって万一にも液が過剰に供給されるようなことを抑制することができ、前記供給制限の精度を確保しやすい。

5

【００１５】供給制限部や絞り部が旋回渦巻部品の供給経路に設けられ、この供給経路の供給制限部や絞り部よりも上流側を旋回渦巻部品の羽根端面における固定渦巻部品との間のシール部材を保持する保持溝にまで分岐させることができる。

【００１６】このような構成では、前記軸受部の潤滑に供される液の供給制限部や絞り部による供給制限を受ける前の、従って、供給制限されずに十分な圧力および量が確保された液を、下流側が供給制限部や絞り部により背圧室への供給制限を受けて進みにくく余剰液を生みやすくなっている分だけ、前記保持溝への供給量を増して、固定渦巻部品および旋回渦巻部品間のシールと潤滑を十分に図ることができ、背圧室への供給制限が強いほど、従って、供給制限部および絞り部双方が設けられているほど有利である。

【００１７】以上のようなスクロール圧縮機における場合を含む、本発明のスクロール圧縮機の駆動方法は、鏡板から羽根が立ち上がった固定渦巻部品と旋回渦巻部品との噛み合わせにて圧縮空間を形成した圧縮機構にて、旋回渦巻部品を固定渦巻部品に対し円軌道運動させたときの圧縮空間の移動を伴う容積の変化により、流体の吸入、圧縮および吐出を行わせるのに併せ、旋回渦巻部品を駆動する軸を通じ液を供給してこの軸の圧縮機構部側の軸受部を潤滑するとともに、旋回渦巻部品の背部には所定の供給制限の基に供給してそれをバックアップしながら、ここでの過剰液を圧縮機構部に供給して潤滑を図るスクロール圧縮機の駆動方法において、前記軸を通じた前記背圧が作用する背圧作用領域への液の供給経路が、軸の回転に伴い間欠的に直接または間接に通じて液の供給を制限することにより、前記背圧を所定の範囲に保ちながら駆動することを主たる特徴とする。

【００１８】このような構成では、軸の駆動で圧縮機構部を働かせて、吸入、圧縮、吐出を行わせるのに併せ、潤滑機構も働かせて前記軸を通じた液の供給経路に沿って圧縮機構部における軸受部に液を供給して潤滑する一方、この液を所定の制限の基に前記背圧作用領域に供給するのに、特に、前記供給経路における供給制限部での前記軸の回転に伴う間欠的な直接または間接的の通じ合い時のみ液を供給するように供給制限をするので、この制限状態の設定によって、つまり軸の回転に伴い間欠的に直接または間接に通じる時間割合や液量の設定によって、供給経路の通路を狭くしなくても液を適正量に制限して供給することができる。従って、背圧やそれを逃がす吸入域での吸入加熱を抑えるために適正量をより少なくするような場合でも、従来のように絞り孔を小さくしていくことにより詰まりやすくなっていた性能低下や信頼性の問題、および加工が困難になってコスト高になるといったような問題のいずれもが解消し、低コストなスクロール圧縮機によって高効率な圧縮機能を発揮することができる。

6

【００１９】本発明のそれ以上の目的および特徴は、以下の詳細な説明および図面の記載によって明らかになる。本発明の各特徴はそれ単独で、あるいは可能な限りにおいて種々な組合せで複合して用いることができる。

【００２０】

【発明の実施の形態】以下、本発明の好ましい実施の形態について図１～図３を参照しながら説明する。本実施の形態は空調、冷凍機器に用いられる密閉型のメンテナンスフリーなスクロール圧縮機に適用した場合を例示してある。したがって、取り扱う流体は冷媒であり、以下、冷媒として説明する。しかし、本発明はこれに限られるものではない。

【００２１】まず、本実施の形態に係るスクロール圧縮機の駆動方法につき、図１～図３を参照しながら説明する。図１に示すように、旋回鏡板２５および固定鏡板４０から羽根が立ち上がった固定渦巻部品１０と旋回渦巻部品１１との噛み合わせにて圧縮空間３２を形成した圧縮機構部２にて、旋回渦巻部品１１を固定渦巻部品１０に対し円軌道運動させたときの圧縮空間３２の移動を伴う容積の変化により、冷媒の吸入、圧縮および吐出を行わせる。これに併せ、旋回渦巻部品１１を駆動する軸の一例である駆動軸６（またはおよびその先端のクランク軸９）を通じこの駆動軸６の圧縮機構部２側の軸受部の一例である主軸受８および旋回軸受１３に液の一例であるオイルなどの潤滑油４１を供給して潤滑する一方、この潤滑油４１を供給制限部１０２を利用した所定の供給制限の基に旋回渦巻部品１１の背部に供給してそれをバックアップしながら、ここでの過剰な潤滑油４１を圧縮機構部２に供給して潤滑を図る。特に、前記駆動軸６を通じた前記背圧が作用する背圧作用領域として設定した例えば背圧室２９への潤滑油４１の供給経路１００が、駆動軸６の回転に伴い間欠的に直接または間接に通じて潤滑油４１の供給を制限することにより、前記背圧を所定の範囲に保ちながら駆動する。

【００２２】このように本方法では、駆動軸６の駆動で圧縮機構部２を働かせて、冷媒の外部サイクルからの吸入、圧縮、外部サイクルへの吐出を行わせるのに併せ、前記駆動軸６を通じた供給経路１００に沿って圧縮機構部２における主軸受８および旋回軸受１３に潤滑油４１を供給して潤滑する一方、この潤滑油４１を所定の制限の基に前記背圧室２９に供給するのに、特に、前記供給経路１００での前記駆動軸６の回転に伴う間欠的で直接または間接的な通じ合い時のみ潤滑油４１を供給するように制限をするので、この制限状態の設定によって、つまり駆動軸６の回転に伴い間欠的に直接または間接的に通じる時間割合や油量の設定によって、供給経路１００の通路を狭くしなくても潤滑油４１を適正量に制限して供給することができる。従って、背圧と、背圧を逃がす吸入域３０での吸入加熱とを抑えるために適正量をより少なく制限するような場合でも、従来の絞り孔を小さく

していくことにより詰まりやすくなっていた性能低下や信頼性の問題、および加工が困難でコスト高になるといった問題のいずれもが解消し、低コストなスクロール圧縮機にて高効率な運転ができる。

【００２３】これを達成するスクロール圧縮機としては、前記した旋回鏡板２５および固定鏡板４０から羽根が立ち上がった固定渦巻部品１０と旋回渦巻部品１１とが噛み合わされて双方間に圧縮空間３２が形成され、旋回渦巻部品１１が固定渦巻部品１０に対しオルダムリングを始めとする各種の自転拘束部品１２や機構による自転拘束の基に円軌道運動されて圧縮空間３２が例えば周辺から渦巻きの中央部に移動しながら容積を例えば縮小していくように変化させることにより、流体の吸入、圧縮および吐出を行う圧縮機構部２と、旋回渦巻部品１１を駆動する駆動軸６（およびまたはその先端のクランク軸９）を通じこの駆動軸６の前記圧縮機構部２側の軸受部である例えば主軸受８および旋回軸受１３を潤滑した後の潤滑油４１を旋回渦巻部品１１の背部の背圧室２９に所定の制限の基に供給し旋回渦巻部品１１をバックアップしながら、潤滑油４１の過剰分を前記圧縮空間３２に逃がして供給し圧縮機構部２内の潤滑に供する潤滑機構１０１とを備え、特に、前記駆動軸６を通じた旋回渦巻部品１１の背部に至る潤滑油４１の供給経路１００に、駆動軸６の回転に伴い間欠的に直接または間接的に通じて潤滑油４１の供給を制限する供給制限部１０２を設けたもので足りる。

【００２４】駆動軸６の電動機３による駆動で圧縮機構部２および潤滑機構１０１が働く。潤滑機構１０１は、前記駆動軸６を通じた潤滑油４１の供給経路１００に沿って圧縮機構部２における主軸受８および旋回軸受１３に潤滑油を供給して潤滑するのに併せ、背圧室２９にも供給して旋回渦巻部品１１をバックアップして固定渦巻部品１０から離れたり、転覆したりするのを防止しながら、背圧室２９での過剰な潤滑油４１を圧縮空間３２に逃がしてそこでのシールや摺動部の潤滑に供するとともに、背圧室２９を所定の圧力域に維持する。

【００２５】このような運転状態において、さらに、潤滑油４１を所定の制限の基に背圧室２９に供給するのに、前記供給制限部１０２が供給経路１００において前記駆動軸６の回転に伴い間欠的に直接または間接的に通じたときだけ潤滑油４１を供給するように供給制限をする。従って、この制限状態の設定によって、つまり供給制限部１０２が間欠的に通じるときの時間割合や油量の設定によって、供給経路１００の通路を狭くしなくても潤滑油４１を適量に制限して供給することができる。従って、背圧や吸入加熱を抑えるのに適正量をより少なく制限するような場合でも、従来のように絞り孔を小さくしていくことにより詰まりやすくなっていた性能低下や信頼性の問題、および加工が困難になってコスト高になるという問題のいずれもが解消し、高効率かつ低コストなスクロール圧縮機が実現する。

【００２６】供給制限部１０２は、駆動軸６の回転に伴い相対移動する部材間に形成されていると、それらの相対移動によって通路同士や通路と空間などが間欠的に直接または間接的に通じ合う開口の位置関係などによって前記供給制限の状態を自由に設定することができるし、必須の部材や既設の部材どうしでも実現する利点がある。

【００２７】具体的には供給制限部１０２は、固定渦巻部品１０または前記主軸受８などの軸受部をなし旋回渦巻部品１１を背部から支持する支持部材の一例である主軸受部材７、における旋回渦巻部品１１の例えば旋回鏡板２５と摺動し合う面に形成された図１、図２に例示するような凹部３３と、旋回渦巻部品１１の側の摺動し合う面に設けられた供給経路１００の開口１００ａとからなり、旋回渦巻部品１１の凹部３３に対する円軌道運動によって凹部３３が背圧室２９に間欠的に通じ前記開口１００ａが凹部３３に常時通じる１つ目の状態と、凹部３３が常時背圧室２９に通じ前記開口１００ａが前記凹部３３に間欠的に通じる２つ目の状態と、凹部３３が背圧室２９と前記開口１００ａとに交互に通じる３つ目の状態と、の１つを満足するものでよい。この３つ目の状態では、特に、供給経路１００と背圧室２９とが凹部３３を介して同時に通じ合うことがなく、供給経路１００に通じて凹部３３に供給された潤滑油４１だけが背圧室２９に供給されるので、同時に通じ合って万一にも潤滑油４１が過剰に供給されてしまうようなことを回避しやすい。

【００２８】また、図１、図２に示すように供給経路１００の一部に他の部分よりも径を絞るなどして狭くした絞り孔２４を始めとする各種形態の絞り部を有していると、この絞り部により加工や詰まりに問題のない程度の絞り効果を得て、前記供給制限部１０２と併せ、より高い供給制限を容易に達成することができるし、そのような絞り部は加工が容易であるので旋回渦巻部品１１などの供給経路１００の一部を狭くするだけで特別な部材なしに形成することができる。特に、図１、図２に示すように供給経路１００の開口１００ａ部に設ければさらに容易に精度よく形成することができ、丸孔とすれば特に加工しやすい。また、図１、図２に示す例とは異なり供給経路１００と背圧室２９とが凹部３３を介して通じ合う時点があっても前記絞り孔２４などの絞り効果によって万一にも潤滑油４１が過剰に供給されるようなことを抑制することができ、前記供給制限の精度を確保しやすい。

【００２９】供給制限部１０２や絞り孔２４などの絞り部が、図１に示すように旋回渦巻部品１１の供給経路１００に設けられ、この供給経路１００の供給制限部１０２や絞り部よりも上流側を旋回渦巻部品１１の羽根端面における固定渦巻部品１０との間のシール部材としての

チップシール３５を保持する保持溝３６にまで分岐させた分岐路３４を形成してある。これにより、供給制限部１０２や絞り孔２４などの絞り部による供給制限を受ける前の、従って、供給制限されずに十分な圧力および量が確保された潤滑油４１を、下流側が供給制限部１０２や絞り部により背圧室２９への供給制限を受けて進みにくく余剰液を生みやすくなっている分だけ、分岐路３４を通じた前記保持溝３６への供給量を増して、固定渦巻部品１０および旋回渦巻部品１１間のシールと潤滑を十分に図ることができ、供給制限が強いほど、従って、供給制限部１０２と絞り孔２４などの絞り部との双方が設けられているほど有利である。このような固定渦巻部品１０と旋回渦巻部品１１との摺動部に直接に潤滑油４１を供給する機構によって十分なシール性および潤滑性が確保できる場合、背圧室２９の過剰な潤滑油４１を圧力調整機構３１により逃がすのに吸入域３０に対して行わなくてもよい。

【００３０】本実施の形態の図１、図２に示す例について、さらに具体的に説明する。駆動軸６は電動機３に連結されて圧縮機構部２を駆動する。圧縮機構部２および電動機３は縦型の密閉容器１内に上下に配設されている。電動機３は密閉容器１の内側に固定されたステータ４と、このステータ４の内側に回転できるように配置されたロータ５とで構成されている。このロータ５には駆動軸６が貫通状態で結合され、この駆動軸６の一端は上記圧縮機構部２の一部を構成する主軸受部材７に主軸受８を介し軸受けされ、他端側は密閉容器１内の下部に設けられた副軸受け部材１０６により副軸受１７を介し軸受けされ、これによって、駆動軸６はロータ５とともに一体回転できるように支持されている。

【００３１】駆動軸６の主軸受８の上に出た一端側の先端には駆動軸６に対して偏心運動を行うクランク軸９が備えられている。一方、密閉容器１内に主軸受部材７を介して、または直接固定された固定渦巻部品１０と旋回渦巻部品１１を噛み合わせることにより複数の圧縮空間３２を形成するとともに、主軸受部材７と固定渦巻部品１０との間に旋回渦巻部品１１を挟み込んで保持している。主軸受部材７と旋回渦巻部品１１との間に自転拘束部品１２を備えて旋回渦巻部品１１の自転を防止するのに併せ、クランク軸９により旋回渦巻部品１１を旋回軸受１３を介し駆動することにより、旋回渦巻部品１１を円軌道に沿って旋回運動のみをさせる。これによって、圧縮空間３２を外周部から渦巻の中心に向かって容積を減少させながら移動させ、吸入ポート１４を通じて外部サイクルから冷媒ガス等を吸入し、圧縮する。また、圧縮した冷媒ガス等は吐出ポート１５を通り、密閉容器内空間１６に吐出される。

【００３２】また駆動軸６の副軸受１７から下方に出た他端側の先端には容積型ポンプ１８を備え、駆動軸６によって圧縮機構部２と共に駆動される。容積型ポンプ１８は密閉容器１の下部に形成された液溜部１９に貯留された潤滑油４１を吸入した後、駆動軸６内にその軸方向に設けられた給油路２０を経てクランク軸９の上部の液溜まり２１に供給する。これにより、液溜まり２１に供給された潤滑油４１はこれに続く旋回軸受１３に送り込まれてそれを潤滑および冷却した後、次の液溜まり２２を経てさらに主軸受８に送り込まれてこれを潤滑し、その後液溜部１９に戻って再循環される。一方、液溜まり２１に供給された潤滑油４１の一部は、旋回渦巻部品１１の内部に設けられた長孔２３を経由して長孔２３よりも細くした絞り部としての絞り孔２４を経て背圧室２９に供給される。この供給のために前記凹部３３が固定渦巻部品１０の旋回鏡板２５と摺動する面２７に形成され、駆動軸６の回転に伴う旋回渦巻部品１１の円軌道運動により絞り孔２４が前記凹部３３と間欠的に通じ合って潤滑油４１を供給するようにしてある。従って、絞り孔２４から凹部３３に潤滑油４１が供給されるのは絞り孔２４が凹部３３に臨んでいる場合のみとなる。

【００３３】さらに凹部３３は旋回鏡板２５の旋回により旋回鏡板２５が凹部３３と背圧室２９を間欠に連通するようになっている。また凹部３３と背圧室２９の連通区間は絞り孔２４が凹部３３に臨まない区間となるように設定されており、絞り孔２４と背圧室２９が凹部３３を通して連通することはない。絞り孔２４から凹部３３に供給された潤滑油４１は凹部３３と背圧室２９が連通したときに双方の差圧により背圧室２９へ供給される。なお、背圧室２９は旋回鏡板２５と主軸受部材７に設けられた窪み２６と固定渦巻部品１０の面２７とシール部材２８で構成された空間であるが、どのように構成されてもよい。

【００３４】このような凹部３３と絞り孔２４などの開口１００ａとの間で間欠的に通じ合う構成では、凹部３３の形状や大きさと開口１００ａの位置との組み合わせによって前記間欠的に通じ合う時間割合や液量を種々に設定するのが容易である。特に凹部３３が供給経路１００と背圧室２９とに交互に通じて所定量の潤滑油４１を持ち運び供給するタイプでは、凹部３３の容量設定によって１回に供給する液量を自由に設定することができ、背圧室２９に通じ合う時間割合との積によって背圧室２９への潤滑油４１の供給量を決めることができる。

【００３５】また、このような凹部３３を主軸受部材７の旋回渦巻部品１１と摺動する面に設けて、旋回渦巻部品１１の摺動面に設けた供給経路１００の開口１００ａと間欠的に通じ合うようにすることもできる。さらに、凹部３３は旋回渦巻部品１１の固定渦巻部品１０ないしは主軸受部材７との摺動面に形成し、この摺動面と摺動する固定渦巻部品１０または主軸受部材７の摺動面に前記凹部３３と一端が間欠的に通じ、他端が背圧室２９に常時通じるように設けられた孔との組み合わせでも原理的には同様な作用効果が得られる。

【００３６】上記図示したものにおいて、潤滑油４１の供給経路１００は、駆動軸６の下向きの他端から給油路２０、液溜まり２１、長孔２３、絞り孔２４および凹部３３により構成されて、絞り孔２４は供給制限部１０２とともに液溜まり２１から背圧室２９への潤滑油４１の供給量を制限し、適正量が供給できるようにする。ここに、液溜まり２１や２２と背圧室２９との間には圧力差があり、液溜まり２１の側が背圧室２９の側に対する高圧側となっているため、前記シール部材２８は旋回渦巻部品１１および主軸受部材７間にて環状に設けられ、中央側の液溜まり２１、２２とその外回りに位置する背圧室２９とを仕切って、それらが前記供給制限部１０２および絞り孔２４を通らずに通じ合うのを防止している。

【００３７】ところで、供給経路１００は主軸受８および旋回軸受１３の一方または双方を経る経路とされてもよい。供給経路１００が主軸受８または旋回軸受１３を経る経路であるような場合、それを滑り軸受としたときの隙間を絞り部として利用することができるし、このようにすれば絞り孔２４を省略しても同様な絞り効果が得られ、双方を併用するようにすれば絞り効果がさらに向上する。もっとも、供給制限部１００は必須のものとして採用するのは勿論であり、これも原理的には供給経路１０２のどの位置に設けられてもよく、駆動軸６の回転に伴う相対移動部分を利用するのが好適である。

【００３８】また、背圧室２９には前記自転拘束部品１２が配設されており、この背圧室２９に供給される潤滑油４１により潤滑を行っている。背圧室２９に供給された潤滑油４１が溜まるに従い、背圧室２９の圧力が上昇するが、その圧力を一定に保つために、背圧室２９と圧縮空間を生成する吸入域３０の間に圧力調整機構３１が構成されている。背圧室２９の圧力が設定された圧力より高くなると圧力調整機構３１が作動して背圧室２９内の過剰な潤滑油４１を圧縮空間３２における低圧部である吸入域３０に逃がす。これによって、背圧室２９内の圧力を設定されたほぼ一定の範囲に保つと共に、吸入域３０に逃がした潤滑油４１を圧縮空間３２に供給することによって圧縮中の冷媒ガス等の漏れを防ぐシールの役割と、固定渦巻部品１０と旋回渦巻部品１１の接触面を潤滑する役割を果たす。

【００３９】ここに、供給制限部１０２、絞り孔２４、および圧力調整機構３１のそれぞれは、背圧室２９の圧力を調整するのに役立っているが、圧力調整機構３１は圧縮機構部２の潤滑および圧縮空間３２での冷媒圧縮時のシールにも役立ち、このような潤滑およびシールが必須であるとき、圧縮機構部２への特別な潤滑油４１の供給手段を設けない限り圧力調整機構３１は必須となり、少なくとも供給制限部１０２と協働して背圧室２９の圧力調整を行うことになる。

【００４０】次に図１、図２に示す例での絞り孔２４と凹部３３とについて、図３をも併用して詳細に説明する。絞り孔２４は旋回渦巻部品１１の図２の（ａ）～（ｄ）に示す９０°毎の旋回運動状態からわかるように、旋回渦巻部品１１の旋回に伴い、固定渦巻部品１０の面２７と凹部３３にそれぞれ臨む円運動を行う。絞り孔２４が（ｃ）に示すように凹部３３に臨んでいる時に液溜り２１の潤滑油４１は長孔２３と絞り孔２４を経由して凹部３３に供給される。このとき、凹部３３は旋回鏡板２５により閉塞されて背圧室２９に通じていない。一方、絞り孔２４が（ａ）（ｂ）（ｄ）に示すように固定渦巻部品１０の面２７に臨んでいる場合、絞り孔２４がその面２７により閉塞されて潤滑油４１は凹部３３に供給されない。このとき凹部３３は旋回鏡板２５から背圧室２９にはみ出し、背圧室２９に通じている。

【００４１】このようにして、旋回渦巻部品１１の旋回により絞り孔２４は固定渦巻部品１０の面２７によって凹部３３と間欠的に連通させられ、凹部３３は旋回鏡板２５によって背圧室２９と間欠的に連通させられる。また凹部３３と背圧室２９の連通区間は絞り孔２４が凹部３３に臨まない区間に設定されており、絞り孔２４と背圧室２９が凹部３３を通して連通し合うことはない。凹部３３に絞り孔２４より供給された潤滑油４１は凹部３３と背圧室２９が連通したときにそれらの圧力差によって凹部３３から背圧室２９へ供給される。

【００４２】この供給は凹部３３が背圧室２９と同圧になるまで行われるのは勿論であり、凹部３３には背圧室２９と同圧の潤滑油が残る。従って、凹部３３が次に供給経路１００と通じて供給される油量は、前記差圧に相当する分だけであり、これが毎回背圧室２９に定量供給される。

【００４３】このように、凹部３３に溜まった潤滑油４１のみが駆動軸６の回転に伴い背圧室２９へ間欠的に持ち運ばれて供給されるため、背圧室２９、延いては吸入域３０へ供給される潤滑油４１を抑制でき、過剰背圧による過剰接触や吸入域３０への過剰供給による吸入加熱を低減して性能低下を抑えることができる。背圧室２９へ供給される潤滑油４１の量は凹部３３の深さや径を変えることにより、あるいは前記差圧の設定を変更することにより調整することができる。また凹部３３の形状は図４に示すような円形でなくともよい。

【００４４】なお、本発明は潤滑油の供給に容積型ポンプを用いたが、冷媒の吐出圧を利用した背圧室２９との差圧により潤滑油４１を供給する差圧給油型ポンプ方式を採用する場合にも同様の効果を得ることができる。

【００４５】

【発明の効果】本発明のスクロール圧縮機およびその駆動方法によれば、軸の駆動で圧縮機構部および潤滑機構が働き、潤滑機構は、前記軸を通じた液の供給経路に沿って圧縮機構部における軸受部に液を供給して潤滑するのに併せ、この液を所定の制限の基に背圧室に供給するのに、特に、前記供給経路における供給制限部が前記軸

の回転に伴い間欠的に直接または間接的に通じたときだけ液を供給するように供給制限をするので、この制限状態の設定によって、つまり間欠的に通じる時間割合や液量の設定によって、供給経路の通路を狭くしなくても液を適正量に制限して供給することができる。従って、背圧や吸入加熱を抑えるために適正量をより少なくするような場合でも、従来のように絞り孔を小さくしていくことにより詰まりやすくなっていた性能低下や信頼性の問題、および加工が困難になってコスト高になるというような問題のいずれもが解消し、高効率で低コストなスクロール圧縮機が実現する。

【００４６】さらに、供給制限部が、軸の回転に伴い相対移動する部材間に形成されていると、それらの相対移動によって間欠的に直接または間接的に通じ合う開口の位置関係などによって前記供給制限の状態を自由に設定することができるし、必須の部材や既設の部材どうしでも実現する利点がある。

【００４７】また、供給制限部が、固定渦巻部品または前記軸受部をなし旋回渦巻部品を背部から支持する支持部材における旋回渦巻部品と摺動し合う面に形成された凹部と、旋回渦巻部品の側の摺動し合う面に設けられた液の供給経路の開口とからなり、旋回スクロールの凹部に対する円軌道運動によって凹部が前記背圧室に間欠的に通じ前記開口が凹部に常時通じる１つ目の状態と、凹部が常時背圧室に通じ前記開口が前記凹部に間欠的に通じる２つ目の状態と、凹部が背圧室と前記開口とに交互に通じる３つ目の状態と、の１つを満足するものでよく、３つ目の状態では、特に、供給経路と背圧室とが凹部を介して同時に通じ合うことがなく、供給経路と通じて凹部に受け入れた液だけが背圧室に供給されるので、同時に通じ合って万一にも液が過剰に供給されてしまうようなことを回避しやすく、供給経路に絞り部がない場合に特に有効である。

【００４８】また、供給経路の一部に他の部分よりも狭くした絞り部を有していると、この絞り部により加工や詰まりに問題のない程度の絞り効果を得て、前記供給制限部と併せ、より高い供給制限を容易に達成することができるし、そのような絞り部は加工が容易であるので旋回渦巻部品などの供給経路の一部を適度に狭くするだけで特別な部材なしに形成することができる。特に、絞り部を供給経路の開口部に設ければさらに容易に形成することができる。また、供給経路と背圧室とが凹部を介して通じ合う時点があっても前記絞り部があるとその絞り効果によって万一にも液が過剰に供給されるようなことを抑制することができ、前記供給制限の精度を確保しやすい。

【００４９】また、供給制限部や絞り部が旋回渦巻部品の供給経路に設けられ、この供給経路の供給制限部や絞り部よりも上流側を旋回渦巻部品の羽根端面における固定渦巻部品との間のシール部材を保持する保持溝にまで分岐させると、前記軸受部の潤滑に供される液の供給制限部や絞り部による供給制限を受ける前の、従って、供給制限されずに十分な圧力および量が確保された液を、下流側が供給制限部や絞り部により背圧室への供給制限を受けて進みにくく余剰液を生みやすくなっている分だけ、前記保持溝への供給量を増して、固定渦巻部品および旋回渦巻部品間のシールと潤滑を十分に図ることができ、背圧室への供給制限が強いほど、従って、供給制限部および絞り部双方が設けられているほど有利である。

【図面の簡単な説明】

【図１】本発明の１つの実施の形態に係るスクロール圧縮機を示す断面図。

【図２】図１の圧縮機における供給制限部の動作状態を（ａ）～（ｄ）の旋回渦巻部品の９０°毎の旋回位置によって示す説明図。

【図３】図２の供給制限部の部分拡大図。

【図４】従来のスクロール圧縮機を示す断面図。

【図５】図４の圧縮機における潤滑油を背圧室に供給する経路に設けられた絞り部の断面図。

【符号の説明】

１　密閉容器
２　圧縮機構部
３　電動機
６　駆動軸
７　主軸受部材
８　主軸受
９　クランク軸
１０　固定渦巻部品
１１　旋回渦巻部品
１２　自転拘束部品
１３　旋回軸受
１４　吸入ポート
１５　吐出ポート
１６　密閉容器内空間
１７　副軸受
１８　容積型ポンプ
１９　液溜部
２０　給油路
２１　液溜まり
２２　液溜まり
２３　長孔
２４　絞り孔
２５　旋回鏡板
２９　背圧室
３０　吸入域
３１　圧力調整機構
３２　圧縮空間
３３　凹部
３４　分岐路
３５　チップシール

15

３６　保持溝

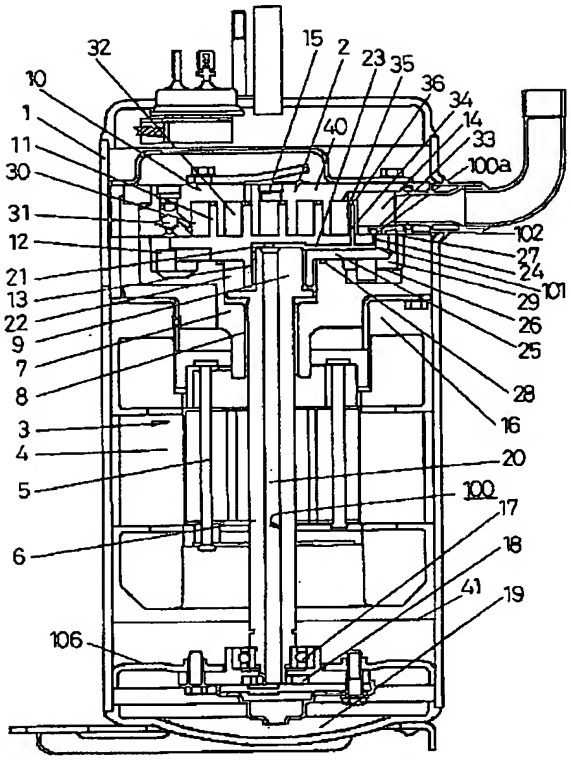
１００　供給経路

16

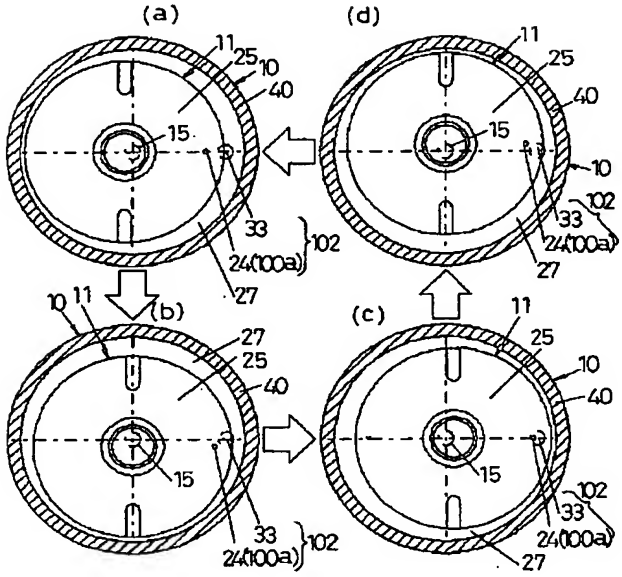
＊１０１　潤滑機構

＊　１０２　供給制限部

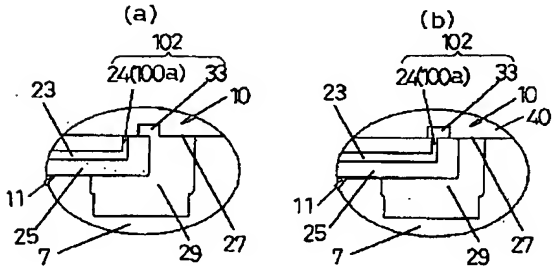
【図１】



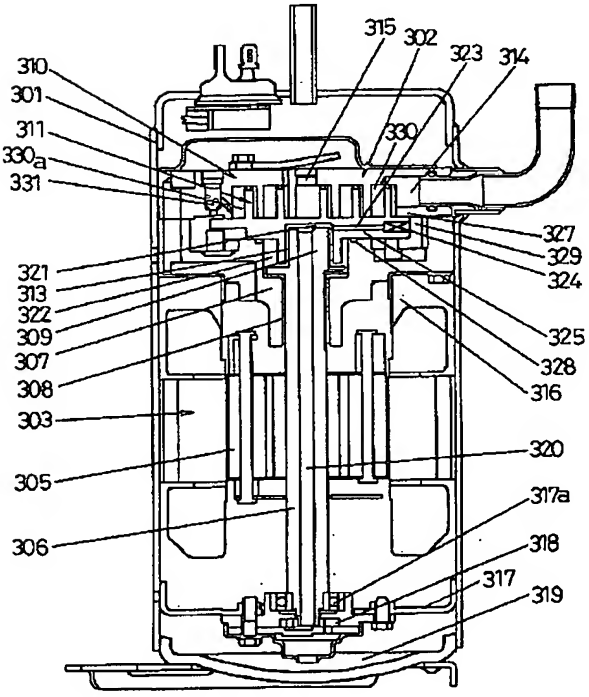
【図２】



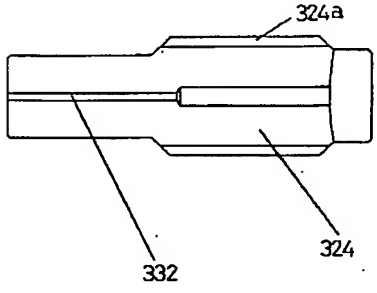
【図３】



【図４】



【図５】



フロントページの続き

(72)発明者　鶸田　晃
大阪府門真市大字門真1006番地　松下電器
産業株式会社内

Ｆターム(参考)　3H029 AA02 AA14 AB03 BB01 BB03
BB06 BB08 BB09 BB42 BB43
CC06 CC32 CC34 CC58
3H039 AA03 AA06 AA12 BB04 BB11
BB15 BB16 BB28 CC08 CC09
CC11 CC27 CC29 CC30 CC40
CC44